

**CONFERENCE OF SOCIETY FOR CONSERVATION GIS IN RUSSIA**

**Fire regime forest ecosystems mapping of  
Pechora-Ilych biosphere nature reserve**

Alexandra Plotnikova  
Anastasiya Charitonova  
Dmitrii Plotnikov  
Aleksei Aleinikov  
Valentina Burtseva

Center for Forest Ecology and Productivity of the RAS

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# Fire regime

- The degree at which fire impacts forest ecosystems when it fully or partly alters the state and species' variety for years to come

1. How often is the area affected by fires?

2. How do fires affect ecosystems?

# Objective



To study and elaborate the methodology to map forest fire regimes at local level

Research is funded by RFBR (project 17-05-00300)

# Aims&Problems

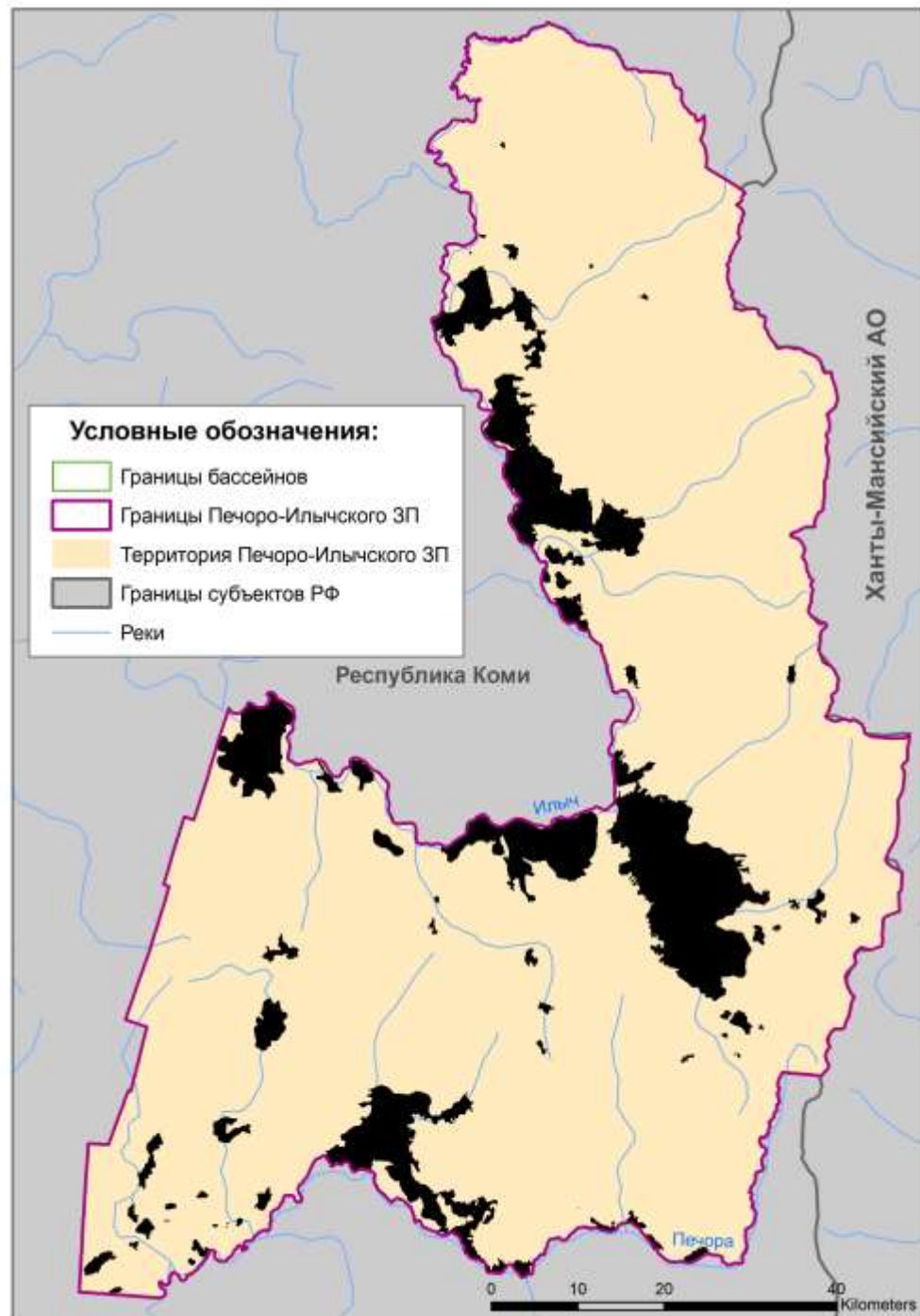
1. Elaboration a methodology for identification of past forest fire regimes at local level;
2. Development a method for identification of present-day forest fire regimes at local level;
3. Creation and comparative analysis of maps depicting past and present-day forest fire regimes over Pechora nature reserve;
4. Implementation of WEB-GIS interface dedicated to forest fire regimes at local level.

# Indicators of forest combustibility

- **Fire frequency,**
- **Typical burn area,**
- **Fires severity,**
- **Fire return interval**– the time between fires in a defined area,
- **Fire rotation**– the time required to burn an area equal to a defined area of the landscape.

**DATA**

# Fires history for dark-coniferous stands of Pechora nature reserve since second half of 19-th century



Алейников А. А., Тюрин А. В., Симакин Л. В., Ефименко А. С., Лазников А. А. История пожаров в темных хвойных лесах Печоро-Ильчского заповедника со второй половины XIX века по настоящее время // Сибирский лесной журнал. 2015. № 6. С. 31–42.

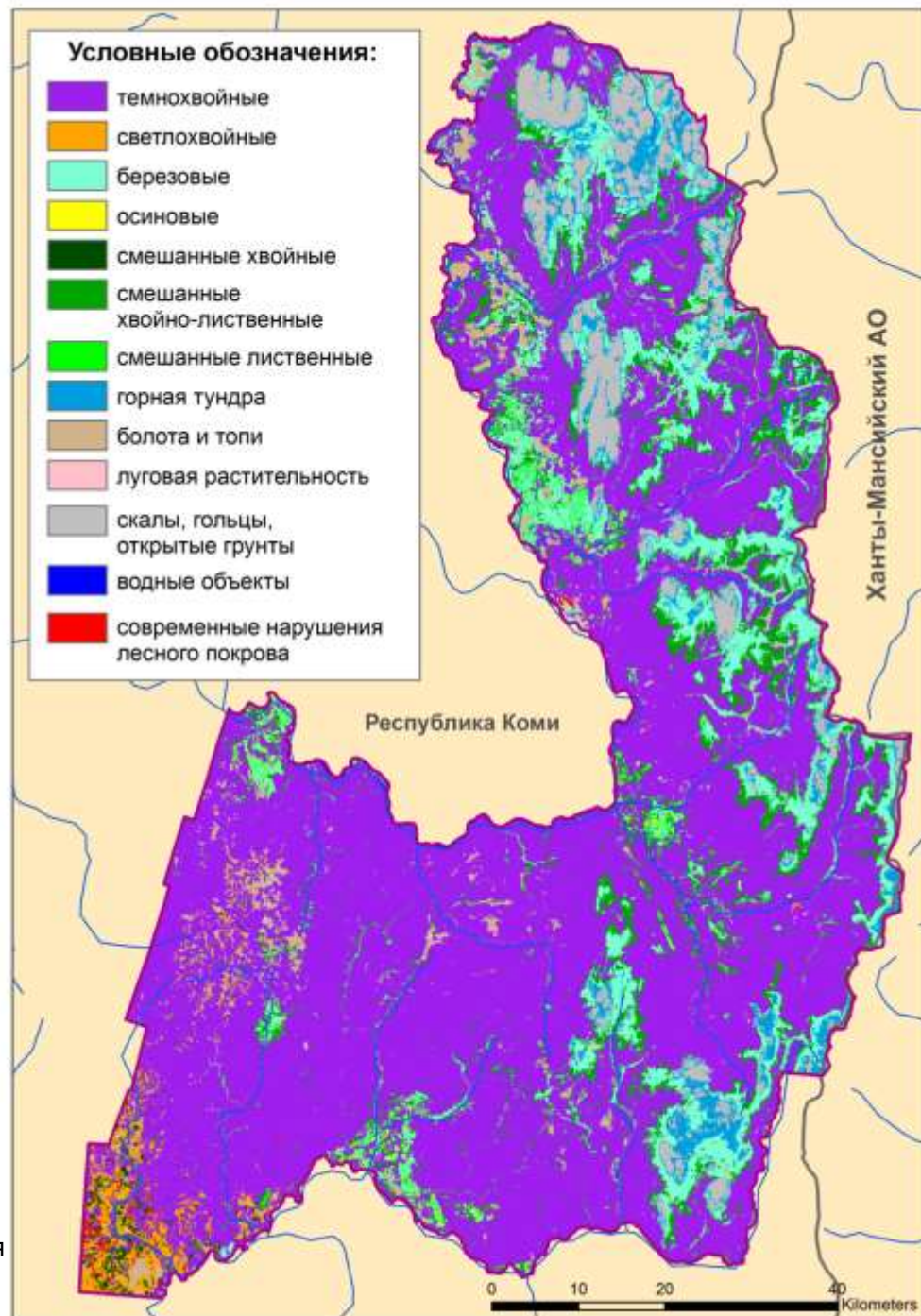
# Records of fires observed by airborne and ground-based means of monitoring





# Terrestrial ecosystems landcover map for Pechora nature reserve

Based on remote sensing data of  
Landsat-TM\ETM+



Ершов Д.В., Бурцева В.С., Гаврилюк Е.А., Королева Н.В.,  
Алейников А.А. Диагностика современного сукцессионного состояния  
лесных экосистем Печоро-Ильчского заповедника по спутниковым  
тематическим продуктам // Лесоведение, 2017, №5, С. 1-12

# **Selection of a Spatial Unit to account for forest fire disturbance**

# Spatial unit of disturbance analysis

- maximum area with relatively same spatio-temporal pattern of disturbance

dominant ecosystems types and wood species

multi-annual statistics on forest fires disturbance

One needs to account following aspects to asses fire regimes at local and regional levels:

- Landscape type,
- Topography,
- Forests management regime,
- Natural and man-made ignition sources.

## River basins – are they really smallest spatial units for fire regimes identification?

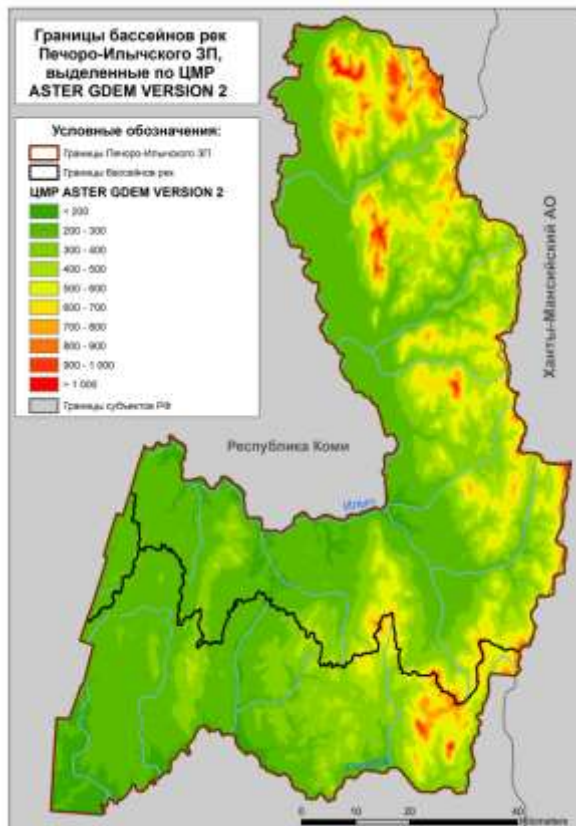
DEM ID	Absolute vertical accuracy		Pixel size
	LE90	RMSE	
GMTED2010	56-60 m	26-30 m	7,5" (250 m)
ASTER GDEM VERSION 2	12-30 m	6-15 m	1" (30 m)
TanDEM-X	10 m	< 2 m	0,4'' (12 m)

**LE90** – threshold value for 90% of deviations.

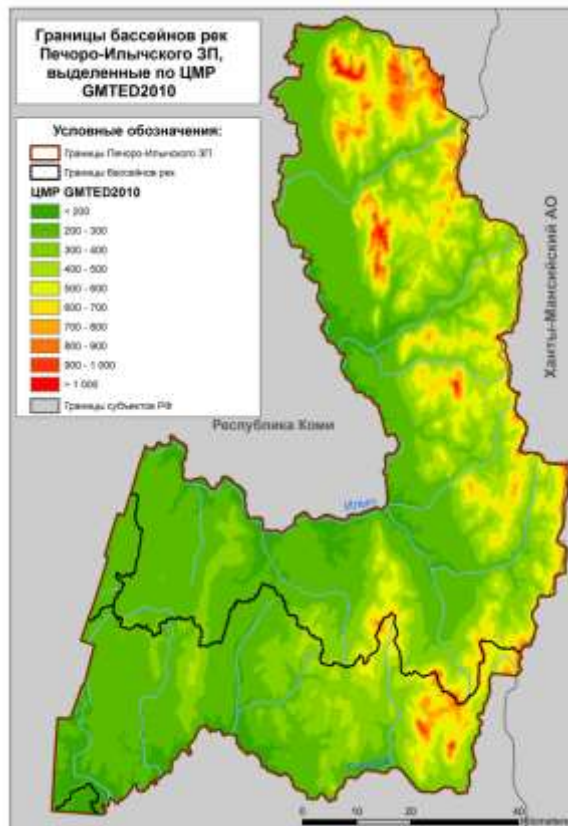
**RMSE** – root mean squared error, based on deviation between current DEM and model one.

# River basins identification

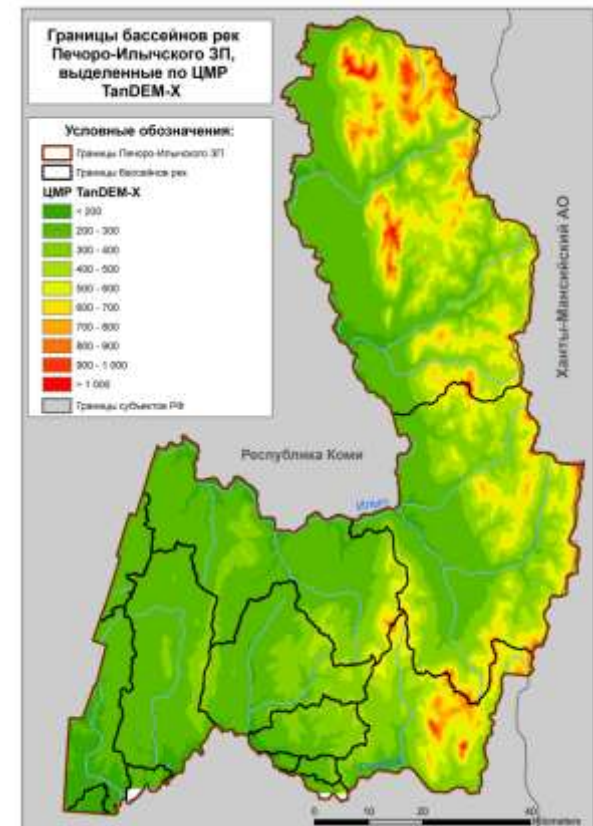
## GMTED2010



## ASTER GDEM VERSION 2



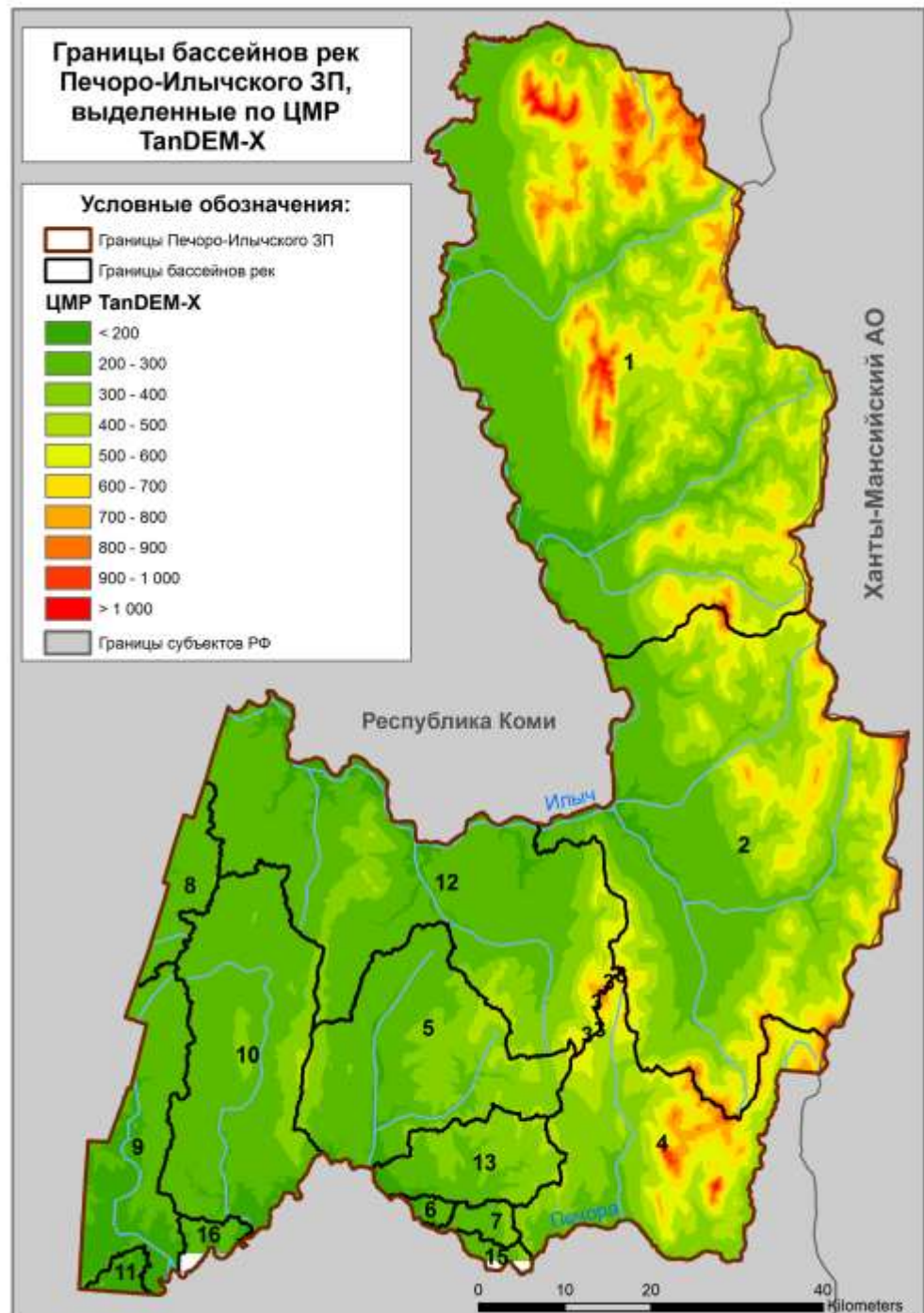
## TanDEM-X





# River basins types

1. Basin is ready to be used for fire regimes assessment,
2. Basin should be merged with neighbor basins,
3. Basin should be split over smaller forested areas.



# Our experience in WEB-GIS interface implementation



Таблица содержания:

- Административные границы:
  - ФО, субъектов РФ, районов
  - Российской Федерации

- Населенные пункты:
  - столицы субъектов ЦФО
  - города
  - населенные пункты

Города (полигоны)

- Заповедники (ООПТ)

Железные дороги

Автомобильные дороги

Гидрография: озера

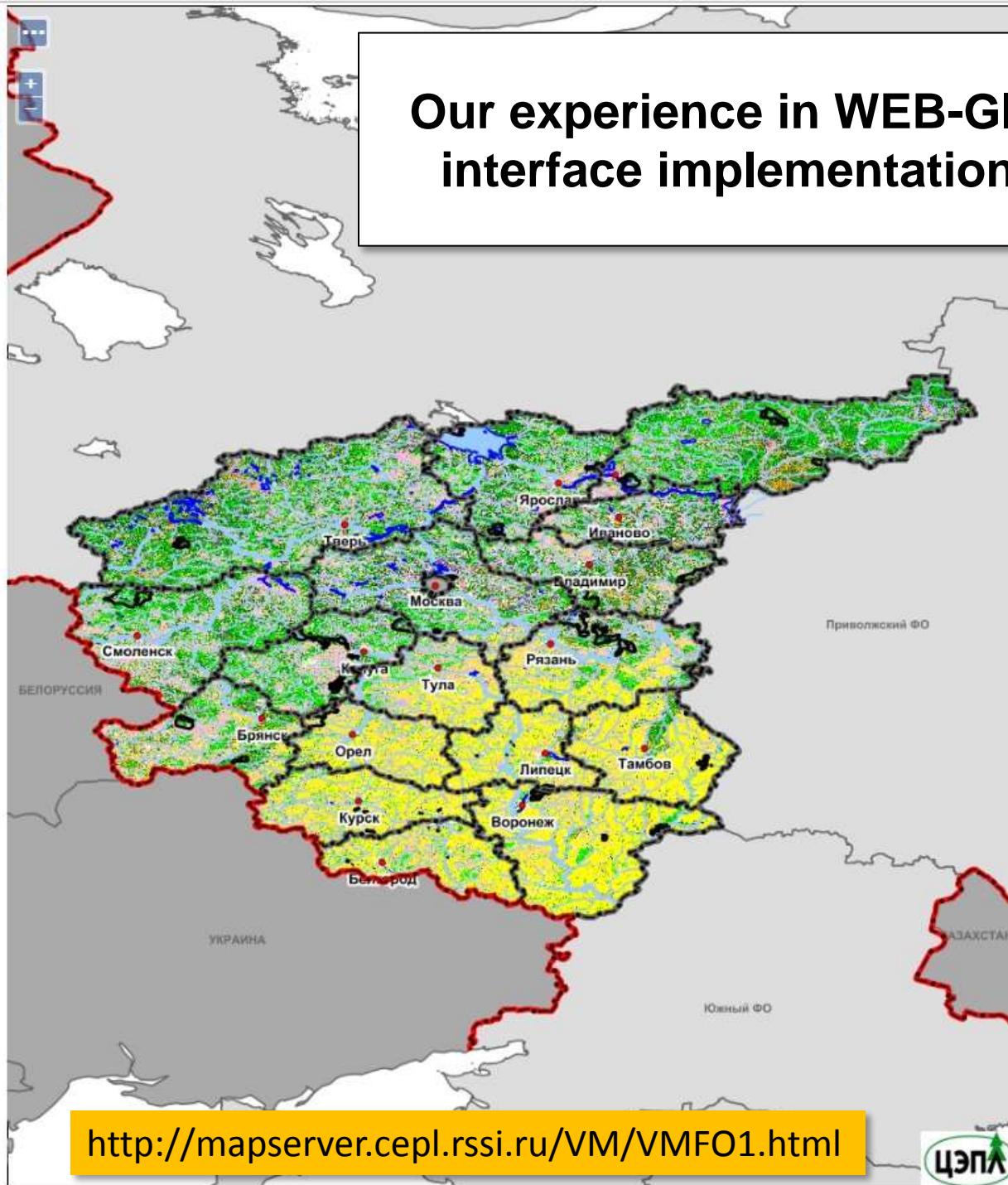
Гидрография: реки

Карта растительности ЦФО:

- 2014 г.
- 2010 г.

- Темнохвойные вечнозеленые
- Светлохвойные вечнозеленые
- Лиственные
- Смешанные с преобладанием хвойных
- Смешанные
- Смешанные с преобладанием лиственных
- Луга
- Болота и топи
- Сельскохозяйственные угодья
- Открытые грунты и выходы горных пород
- Реки и водоемы
- Урбанизированные территории
- Дополнительные слои:

- федеральные округа РФ
- соседние государства



<http://mapserver.cepl.rssi.ru/VM/VMFO1.html>



Thanks for attention!

**Center for Forest Ecology and Productivity of the RAS**

<http://cepl.rssi.ru/>

**Plotnikova Alexandra**

[alexandra@ifi.rssi.ru](mailto:alexandra@ifi.rssi.ru)

